Seminar on Combinatorial Computing
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Room 6417, Graduate Center
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Ordinary points for arrangements in the Euclidean and projective planes

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Abstract

A classical theorem of Sylvester states that any finite set of points in the plane, not all collinear, determines a line through precisely two of the points. Such a line is called an *ordinary* line. Given n such points, how many ordinary lines must there be? In 1993, Csima and Sawyer showed that except for the case $n = 7$ there must be at least $6n/13$ ordinary lines. By projective duality, the problem is equivalent to asking for the number of ordinary points of intersection in an arrangement of n projective lines. A famous conjecture states that as long as $n \neq 7, 13$, there must be at least $n/2$ ordinary points.

I consider the analogous problem in the Euclidean plane. Given an arrangement of n lines in the Euclidean plane, not all passing through a single point and not all parallel, I show that there must be at least $n/6$ ordinary points. I also describe some progress towards establishing the $n/2$ conjecture for the projective case.

Joint work with Hervé Brönnimann.

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http://www.math.nyu.edu/~pach/public_html/combinatorics_seminar.html